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<b>13. ABSTRACT (Maximum 200)</b>  The two fundamental objectives of this contract were Data entry of all Flying Duty Medical Examination (FDME) and analytical support and research data retrieval for clinical assessment purposes. Each FDME was entered into the backlog file and a print out of all prior medical history was generated. All medical history was given a ICD-9-CM code. After all medical history has been coded and an AEDR file established other medical information is transcribed into the AEDR from the FDME. There are approximately 172 fields in the AEDR for administrative and medical testing results. Utilizing the 40-501, various APLs, and the Flight Surgeons guide, each FDME is then pre-reviewed, or screened for medical conditions which are out of standards and any medical conditions which may require special action by the Aeromedical Activity Screeners. A recommendation is then written on the accompanying computer generated cover sheet. The entire packet is then forwarded to the Aeromedical Activity flight surgeon for Review and Disposition. As an ongoing process, contract personnel sought ways to promote the quick turnaround of FDMEs without losing quality assurance. Also searched for was a quick and accurate way to track an FDME and eliminate repetitive time use for the flight surgeon in the field, while at the same time making available to him information concerning the air crewmember he would be examining. Each year aviators and aviation related personnel are required to take a Flight Duty Medical Examination. One requirement of the annual FDME was to complete a Standard Form 93 medical history form. Due to the tremendous number of FDMES processed annually through the Aeromedical Activity, it became necessary to develop a process by which a FDME could be located quickly. Status codes were implemented and generated by the computer at each stage of the FDME processing. In addition to quality control efforts previously mentioned, review of specific medical history coding areas has been accomplished by USAARL investigators and scientists. The Aviation Epidemiology Data Register contains medical information which in other research projects might take months or years to accumulate. The AEDR offers a unique opportunity to study not only those areas which may have an affect on Army Aviation (i.e. Desert Storm Syndrome) changes in duty station, etc.				
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(No)<sup>te</sup> For the protection of human subjects, the investigator(s) have adhered to policies of applicable Federal Law 32 CFR 219 and 45 CFR 46.

(No)<sup>te</sup> In conducting research utilizing recombinant DNA technology, the investigator(s) adhered to current guidelines promulgated by the National Institutes of Health.

Surinder K. Sain  
PI Signature

8/1/96  
Date

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## **AVIATION EPIDEMIOLOGY DATA REGISTER (AEDR)**

### **INTRODUCTION**

The Aviation Epidemiology Data Register (AEDR) Contract No. DAMD17-92-C-2062 began 2 March 1992 and was a continuation of a previous contract. The two fundamental objectives of this contract were Data entry of all Flying Duty Medical Examination (FDME) and analytical support and research data retrieval for clinical assessment purposes. Effective 1 May 1995, the analytical support and research data retrieval portion of this contract were discontinued, with the approval of the Medical Research and Development Command, due to the resignation of the Prime Investigator, Dr. Robert Schrimsher. AEDR and Waiver Suspense information requested after this date were processed by Dayna Meuli, on site manager, with the assistance of Dr. Heber Jones, Chief Computer Programmer, USAARL. Surinder K. Saini, Ph.D., Prime Technology, Inc., Dayton, Ohio, was appointed Prime Investigator.

The focus of the analytical support portion of this contract was basically unspecified. That is, there was no specific research designated within the statement of work. The data analyst responded to approved data analysis requests, with most requests directed at finding selected ICD9 codes stratified by age, gender, FDME status, etc.

### **ANALYTICAL SUPPORT**

#### **Data Analysis Requests:**

Data analysis requests were mostly generated by researchers and scientists within USAARL (U.S. Army Aeromedical Research Laboratory). In addition to requests from other Army agencies, requests for numbers of individuals with specific medical diagnosis also were received from Air Force and Navy flight surgeons, Freedom of Information Act requests, individual requests from attendees of the Flight Surgeons course, and requests for information to be used for waiver and policy change discussions.

Data requests were not limited solely to the AEDR. Another data base often queried is referred to as the waiver/suspense file. This file contains medical information related to granting or not granting medical waivers for an aircrew member.

Although it would be impractical to discuss each request, there were specific requests for information which could possibly have an effect on worldwide Army Aviation. These are as follows:

- a. The annual average of permanently grounded Warrant Officer within a period of five years. This was used for a briefing to consider having an additional skill area for permanently grounded Warrant Officers within the aviation community.
- b. The Commander, Fort Rucker, requested the number of aviators which would be affected if current sitting height restrictions were changed from 95cm to 98cm, 99cm, 100cm, or 101cm. At present aviators with a sitting height over 95cm are restricted from flying the OH-58 helicopter without a waiver.

This information is being used in assessing need for a waiver for height in the TH-67 training helicopter, and a risk assessment. This same information was requested for a staff study conducted by the Warrant Officer Career Center in conjunction with the U.S. Army Safety Center.

## **PUBLICATIONS**

During the contract period, five publications were completed by the Principal Investigator, Dr. Robert Schrimsher, in conjunction with other USAARL investigators. One publication was in open literature, and the remaining were technical reports. Listed below are the cited publications followed by the abstracts.

Lattimore, Morris and Schrimsher, Robert H. Refractive Error Distribution and Incidence Among U.S. Army Aviators. Military Medicine. Vol 158. No. 8. Aug 93.

Spectacle incompatibility has been a major problem in the fielding of advanced Army avionic and electro-optical systems. As a result, routine contact lens wear may be instituted as an option to spectacles. Refractive error data were extracted from the Aviation Epidemiological Data Registry, a computer-accessible repository of flight physical medical information on the entire Army aviation population. Refractive error distribution patterns in the class 1 and class 2 flight physical populations were analyzed in order to provide a contact lens supply reference database, estimate the annual incidence of refractive error development, and estimate costs of possible spectacle-wearer flight-duty deselecting. Contact lens wear appears to be a more cost-effective alternative than deselecting.

Mason, Kevin T., Samuel G. Shannon and Robert H. Schrimsher. U.S. Army Aviation Epidemiology Data Register: Prevalence of Refractive Error Among U.S. Aircrew Members. Fort Rucker, AL: U.S. Army Aeromedical Research Laboratory, Report 93-24.

The U.S. Army aviation branch is making final funding and planning decisions on the fielding of a contact lens program for Army aircrew members. This report stratifies the prevalence of refractive error by aviation duty position, service component, and rank. There is an increasing prevalence of refractive error in the

higher ranking aircrew members, paralleling increasing age with rank promotion. Comparing service components, the prevalence is higher in the reserve component and civilian forces than active duty forces. Within the aviator service component cohorts, there has been a significant upward trend in the annual period prevalence of refractive error from 1988 through 1992, especially in the Army Reserve and National Guard cohorts. This upward trend may be related to the observed upward trend in the average age of Army aircrew members as a group from 1986 through 1990.

The purpose, format, design, and variables of the following monogram publications are the same. The only differences are the dates of the data, i.e., the monogram for CY 1992 pertains to aviator data for only that particular year. The following abstract is applicable for each report except for the calendar year (CY) that the data pertains.

Schrimsher, Robert H. and Shannon, Sam. Monogram of the Aviation Epidemiology Data Register for CY 1988. Fort Rucker, AL: U.S. Army Aeromedical Research Laboratory, Report 93-33.

Schrimsher, Robert H. and Shannon, Sam. Monogram of the Aviation Epidemiology Data Register for CY 1991. Fort Rucker, AL: U.S. Army Aeromedical Research Laboratory, Report 93-12.

Schrimsher, Robert H. and Shannon, Sam. Monogram of the Aviation Epidemiology Data Register for CY 1992. Fort Rucker, AL: U.S. Army Aeromedical Research Laboratory, Report 93-35.

The purpose of these monograms was to provide descriptive statistics within the Aviation Epidemiology Data Register (AEDR) of selected variables from an aviator's annual class 2 or 2A Flying Duty Medical Examination (FDME) for the applicable years. Only aviators from a major Army component were considered, active duty, reserve, or National Guard. Little discussion is provided for each table so as to encourage comparisons with monograms.

## **DATA ENTRY**

The Data Entry portion of this contract was separated into three sections of work; ICD9 coding, data transcription, and pre-review of the FDME (Flight Duty Medical Examination). Included within each area was a quality control system which was implemented to speed up processing of FDMEs and correct previous erroneous information which had been entered. Each section of work will be discussed individually.

## **Coding**

Coding of all medical history listed on the FDME using ICD-9-CM began prior to 2 March 1992. At that time, all flight surgeons and air crewmember comments regarding medical history, were transcribed into two medical history fields in the AEDR record. Effective 2 March 1992, as each FDME arrived and was entered into the backlog file by Social Security Number, a print out of all prior medical history was generated. Much of the information contained in the medical history file was repetitive and fragmented. Coders, using the ICD-9-CM code book and other guidelines, combined all like medical history and assigned ICD-9-CM codes to history which had not been previously coded. This enabled a clear and concise record (Verification Sheet) to be printed for return with the current FDME which could be utilized by the flight surgeon in saving processing time for the service members next annual examination and also for verifying medical history contained within the AEDR as being correct. This also allowed for concise and correct data for research purposes.

All medical history contained in the FDME packet is given a code, utilizing the ICD-9-CM coding book, Medical dictionaries, Physicians Desk Reference. EKG tracings are coded using a list of EKG codes generated by USAARL for specific conditions found on the EKG. Other areas which have specific fields in the AEDR are also coded if they are outside the standards set by the Aeromedical Activity, Ft. Rucker, Al. Some of these areas include laboratory results, audio and vision.

Aviation duty personnel are considered 'well patients' for the purpose of their annual physical examination. Because of this there may be conditions that are not covered by the standard ICD-9-CM codes. For this reason a special coding committee was set up comprised of representatives from the Aeromedical Activity, USAARL and contract personnel. This committee was responsible for discussing and generating, when necessary, special codes or coding procedures to cover these conditions, i.e. 'condition occurred during Desert Storm', 'Operation Joint Endeavor', different levels of drug and alcohol abuse, etc.

## **Data Transcription**

After all medical history has been coded and an AEDR file has been established other medical information is transcribed into the AEDR from the FDME. There are approximately 172 fields in the AEDR for administrative and medical testing results. For quality assurance, each FDME is entered blind into the AEDR by two different transcribers. Differences in value are then reconciled by the supervisor. After differences in entry are reconciled a verification sheet is generated and attached to the FDME packet. All information found in the FDME packet is entered into the AEDR whether required or not. There are repeat laboratory results fields for those results that may affect the cardiac risk index.



### **FDME Screening/Pre-review**

Flight Duty Medical Examinations are separated into five basic groups after entry into the AEDR. These groups are air crew members over age 40, air crew members under age 40, air crew members with a wavered medical condition, and Initial class 1 and 2 FDMEs. Utilizing the 40-501, various APLs, and the Flight Surgeons guide, each FDME is then pre-reviewed, or screened for medical conditions which are out of standards and any medical conditions which may require special action by the Aeromedical Activity Screeners. The Screeners also verify that all previous medical history and current medical history listed in the entire FDME packet has been correctly coded and transcribed into the AEDR. A recommendation is then written on the accompanying computer generated cover sheet. This recommendation includes a status code, medical conditions which may require a waiver, and missing information. The entire packet is then forwarded to the Aeromedical Activity flight surgeon for Review and Disposition.

### **Flight Duty Medical Examinations Processed**

For the period 2 March 1992 to 7 June 1996, there were 120,889 FDMES entered into the data base, 118,802 were given a quality assurance second entry, and approximately 160,000 records were edited to add additional information, check the differences between entries, and change status codes.

### **IMPROVEMENTS IN PROCESSING FDMES**

As an ongoing process, contract personnel sought ways to promote the quick turnaround of FDMES without losing quality assurance. Also searched for was a quick and accurate way to track an FDME and eliminate repetitive time use for the flight surgeon in the field, while at the same time making available to him information concerning the air crewmember he would be examining.

### **Verification Sheets**

Each year aviators and aviation related personnel are required to take a Flight Duty Medical Examination. One requirement of the annual FDME was to complete a Standard Form 93 medical history form. All entries had to be commented on by both the air crewmember and the local flight surgeon, and were required to contain all medical history from birth to the current year. Although time consuming, this was the only process by which to assure that all medical history was reviewed by both the flight surgeon and the medical review board. It was suggested by Prime Technology personnel that an AEDR medical Verification Sheet containing all previously ICD-9 coded medical history be generated and returned with the air crewmember's current FDME. The information contained on the verification sheet could then be reviewed by the air crewmember and his local flight surgeon for accuracy. Any additional or incorrect

information could be notated on the form and returned to the Aeromedical Activity, for entry into the AEDR. At the air crew members next annual FDME, he and the flight surgeon performing the exam would only need state that previous medical history had been verified and then address only those medical problems occurring since his last FDME. It was also suggested that the verification sheet show all previous FDME's stored in the AEDR along with any waiver information. This would enable the local flight surgeon to note any FDME that had not been submitted to AAMA and also alert him to any annual waiver requirements the air crewmember might have.

With the agreement of the Aeromedical Activity and the assistance of the Chief Programmer, USAARL, this program was implemented approximately six months after the start of the contract. Although an accurate accounting of savings in man hours and cost cannot be gauged since the implementation of this procedure, it is estimated at 25% to 50% of previous processing time.

### **Return Sheets**

Previously when a Flight Duty Medical Examination had required medical information missing, or a medical condition which required a further work-up, pre-review personnel had to fill out a return form requesting this information and return it with the FDME. To save processing time, it was suggested by contract personnel that the return sheet be generated by the computer at the time the return information was entered into the AEDR record. The Aeromedical Activity concurred and with the assistance of the Chief Programmer, USAARL, this program has been implemented.

### **Annual Waiver Requirement Codes**

At the beginning of this contract there were over 2,000 FDMES awaiting pre-review and processing. Most of these FDMES had been awaiting processing for eight to twelve months. It was apparent that this time had to be minimized, since the number of personnel working the complete processing of the FDMES had decreased from thirteen to ten and the number of FDMES being sent to Fort Rucker for review had increased. In an effort to do this there was an intensive training period for Screeners and the AEDR was updated with current requirements so that the cover sheet generated after transcription would show correct medical information missing or out of standards. This initially decreased the time from arrival at AAMA through pre-review by approximately six to eight months. (This time was later reduced to one week to one month.) The area of most concern was those air crew members with a wavered medical condition.

Air crew members with a disqualifying medical condition are required to have a waiver for this condition. When a waiver is granted, there is normally an annual work-up requirement to monitor the condition. For the purpose of pre-review, each year these FDMES had to be processed through the Aeromedical Activity clerk in charge of micro fiche to obtain a copy of the micro fiche. Obtaining these copies took six to eight weeks. After the micro fiche and FDME was

returned it then had to be read in its entirety on the micro fiche reader to determine the annual waiver requirement and determine if this requirement had been met. Copies were many times unreadable and extensive in nature. It was determined that, with a few exceptions, there were approximately 30 conditions with annual requirement which were seen repeatedly. Each of these conditions had the same or similar annual requirements. It was decided that a code could be generated for these annual waiver requirements and be placed in the waiver suspense record (i.e. AWR18 - Annual Waiver Requirement, Annual Evaluation) at the time the micro fiche copy was screened. It was also determined that at the time a waiver request letter was generated by the Aeromedical Activity, a copy would be sent to contract personnel and the annual waiver requirement code could be entered at that time. By utilizing these codes, the processing time for these FDMES is now approximately one to two weeks or less.

### **Tracking of FDMES**

Due to the tremendous number of FDMES processed annually through the Aeromedical Activity, it became necessary to develop a process by which a FDME could be located quickly. Contract personnel with the assistance of the Chief Programmer, USAARL, suggested status codes that could be, for the most part, generated by the computer at each stage of processing. After pre-review of a FDME a status code is assigned by contract personnel which designate the area of the Aeromedical Activity the FDME is processing through at any given time.

### **AEDR QUALITY ASSURANCE ACTIVITIES**

No medical data entry system is perfect, especially when the system is as complex as the AEDR. Therefore, investigators and data transcribes conduct quality assurance efforts on a daily basis to correct or enter missing information. This has been an on-going process. In addition to quality control efforts previously mentioned, review of specific medical history coding areas has been accomplished by USAARL investigators and scientists. Some of the areas corrected in the AEDR/Waiver Suspense records include cardiovascular disease evaluations, conditions related to herniated nucleus pulposus, and cases related to malignant melanoma. Many coding problems and standards have now been rectified.

### **AEDR BIBLIOGRAPHY**

Requests for medical information contained in the AEDR, Waiver/Suspense File and Medical History file has been utilized, as previously stated, mostly by researchers and scientists within USAARL (U.S. Army Aeromedical Research Laboratory). An AEDR Bibliography is attached. (see attachment one)

## CONCLUSIONS

The Aviation Epidemiology Data Register contains medical information which in other research projects might take months or years to accumulate. In addition to medical information available, data for gender, age, ethnic origin, and component is also available. Although the majority of individuals with records in the AEDR are air crew members, there is also a civilian population represented (i.e., D.A. civilians, Contract civilians, new recruits, ROTC cadets, etc.)

The AEDR offers a unique opportunity to study not only those areas which may have an affect on Army Aviation (i.e. Desert Storm Syndrome) changes in duty station, etc. It is the opinion of Prime Technology, Inc. that the AEDR is under-utilized and its existence and capabilities should be publicized.

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